

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of Parts 1, 21, 73, 74 and 101)	WT Docket No. 03-66
of the Commission's Rules to Facilitate the)	RM-10586
Provision of Fixed and Mobile Broadband)	
Access, Educational and Other Advanced)	
Services in the 2150-2162 and)	
2500-2690 MHz Bands)	
)	
Part 1 of the Commission's Rules – Further)	WT Docket No. 03-67
Competitive Bidding Procedures)	
)	
Amendment of Parts 21 and 74 to Enable)	MM Docket No.97-217
Multipoint Distribution Service and the)	
Instructional Television Fixed Service)	
Amendment of Parts 21 and 74 to Engage)	
in Fixed Two-Way Transmissions)	
)	
Amendment of Parts 21 and 74 of the)	WT Docket No. 02-68
Commission's Rules With Regard to)	RM-9718
Licensing in the Multipoint)	
Distribution Service and in the)	
Instructional Television Fixed Service for)	
the Gulf of Mexico)	

REPLY COMMENTS OF NAVINI NETWORKS, INC.

Navini Networks, Inc, ("Navini"), by its attorneys, hereby files these reply comments in the above-captioned proceeding.

Navini is a manufacturer of "low power" wireless internet access systems. The Navini RipWave 2.6 GHz system is a non line-of-sight, synchronous CDMA system that operates in the MMDS bands. It is designed to deliver high-speed broadband access to residences, home offices and small to medium size business establishments. Using advanced digital signal processing and an adaptive phased array "smart antenna", the Navini base station is capable of generating a custom, highly directional ("beamformed") transmission to each user location. The adaptive phased antenna array and digital

beamforming techniques provide significant enhancement in the signal to interference and signal to noise ratios, improving response station performance while minimizing interference to other spectrum users. The Navini response stations use an omnidirectional antenna, are intended to be purchased commercially and do not require professional installation by an MMDS licensee (“zero install”). Navini will be directly affected by the outcome of a Commission decision in this proceeding.

Navini supports the over-all framework of the original petition filed by the coalition of the Wireless Communications Association International (WCA), the National ITFS Association (NIA) and the Catholic Television Network (CTN) (the “Coalition”). The proposed band plan provides the technical basis for practical co-existence among incumbent high power operators and broadband wireless systems using either Time Division or Frequency Division Duplexing methods. Navini also supports the retention of the existing power limits for base stations and CPE equipment. Of great concern to Navini, and the object of these reply comments, however, is the Coalition’s proposed method of measuring the out-of-band emission mask for MDS base stations (and response stations). The proposed method would have significant adverse consequences for Navini equipment and others offering similar low power systems, hamper the offering of digital services and create inefficient use of the spectrum for new broadband applications. Navini, therefore, urges the Commission either to retain the current measurement procedures for determining out-of-band emissions from digital transmissions in the MDS/ITFS bands or permit its use as an alternative to the Coalition’s proposal.

The Coalition has proposed new emission masks for MMDS/ITFS base stations (and response stations) which Navini fully supports. In connection with these masks, however, the Coalition also recommended a measurement procedure at odds with the current Part 21 rules.¹ This new procedure, if adopted, will penalize wideband data offerings in the bands by imposing unneeded, costly filtering, or by forcing digital data

¹ See Coalition comments at footnote 94.

providers to reduce power to such an extent that the spectrum will cease to be used efficiently.²

Part 21 currently requires out-of-band emissions to be measured in accordance with the masks and procedures set forth in Section 21.908 of the rules. While subparagraph (e) specifies the instrumentation requirements, it does not clearly specify the resolution bandwidth (RBW) setting to be used. This issue was addressed by the Commission in the Digital Declaratory Ruling³ and clarified further in the Report and Order on Reconsideration in Docket 97-217, both of which dealt with two-way digital services similar to what Navini will provide.⁴ In clarifying the Part 21 instrumentation requirements, the Commission discussed how the different digital modulation schemes would necessitate different RBW settings (for in-band versus out-of-band measurements) but did never once suggest that the RBW setting, once selected, should be changed for out-of-band measurements made under a given mask. In other words, once the RBW was set, it was to be used for all out-of-band measurements under the mask. With specific regard to measurements of “flat top” signals (evenly distributed signals falling at the center of the occupied bandwidth of the emission), the Commission suggested a RBW of 100 kHz would be the proper setting.

The Coalition proposal, on the other hand, radically changes this approach by requiring a 1 MHz RBW for in-band measurements, allowing an RBW setting of up to 1 percent of the emission bandwidth of the fundamental frequency to be used for out-of-band measurements made within the first 1 MHz of the channel edge, but requiring a different, more stringent 1 MHz RBW setting for all measurements beyond the 1 MHz side bands. The Coalition has stated that this approach is consistent with the broadband PCS mask under Part 24, (and indeed it is), but has provided no explanation or justification for adopting it in the MMDS/ITFS service bands. Navini believes that consistency with Part 24 is hardly the proper measure here. In practice, the Part 24 PCS technology solutions

² Filtering costs are prohibitive, particularly for a phased array system such as Navini’s employing **eight** transmitters.

³ 11 FCC Rcd at 18858

⁴ 14 FCC Rcd 12764 at 12785

deployed in the United States include IS-95 CDMA with an occupied bandwidth of 1.22 MHz, GSM with an occupied bandwidth of 200 kHz, and IS-136 TDMA with an occupied bandwidth of 30 kHz. But MMDS broadband transmissions will have greater bandwidths, in some cases ranging up to 16 MHz.

The Navini system will have a 5 MHz channel bandwidth packing up to three channels in a 16 MHz MMDS/ITFS block. Use of an RBW for out-of-band emissions specified in Part 24 will distort the measured emissions, the effect of which will be to require the Navini system and others to reduce power or reduce bandwidth, not in aid of preventing out-of-band interference, but merely to eliminate the measurement distortion caused by using an inappropriate RBW.⁵ This result could not have been intended by the Coalition and Navini urges the Commission not to make it the sole method for measuring out-of-band emissions.

Navini submits that the present Part 21 measurement procedure as it has been clarified and explained over the last several years should be permitted at least as an alternative to the Part 24 procedure recommended by the Coalition. An even more up to date procedure is specified in Part 27 for WCS systems. As compared to broadband PCS, WCS systems are much more similar to Part 21 MDS systems. Navini manufactures WCS transmitters which also use a 5 MHz occupied channel bandwidth. The region of the spectrum is similar so both systems must operate in the presence of adjacent spectrum users needing similar levels of protection. Section 27.53(a)(4) explains that measurement instrumentation for WCS shall employ an RBW of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over 1 MHz. For the 5 MHz bandwidth of the Navini transmitter, for instance, the WCS measurement procedure would permit an RBW of 50 kHz, the same as permitted under Part 21, as it has been interpreted.

⁵ In Attachment A, Navini submits the results of a study of four spectrum analyzer graphs showing the results of measuring out-of-band emissions using different RBWs.

Navini urges the Commission to either retain the existing Part 21 measurement procedure or apply the Part 27 measurement procedure to be used as an alternative to the procedure recommended by the Coalition. The Part 21 and Part 27 procedures will not impact the out-of-band limits as proposed by the Coalition. Systems using these procedures must still be shown to meet the proposed out of band noise limits, and the Navini system does. Without access to these alternative test procedures, out-of-band emissions measurements will be in error with such error rising in proportion to the bandwidth of the system. In the attachment to this reply, Navini illustrates how the Coalition's recommended measurement procedure overstates out-of-band emissions from a broadband digital system by 17 dB. Without access to the alternative measurement recommended above, equipment vendors such as Navini, will be penalized solely because of a measurement method modeled on the Part 24 rules. In turn, the equipment cost and operating cost to licensees using such equipment will be higher to compensate for this measurement error.

Respectfully submitted,



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October 23, 2003

Study of Spectrum Analyzer Measurements **by Paul Prudhomme, Navini Networks**

Study Details

Four spectrum analyzer graphs, graphs 1, 2, 3, and 4 are presented. The spectrum analyzer is set-up to measure and display channel power and out of block channel power. The trace will also help illustrate the relative difference in measured power for different Resolution Bandwidth (RBW) settings.

The channel power measurement is displayed in text under the heading “CH PWR” and is measured in absolute terms. The out of block channel power is displayed in text under the headings “ACP Up”, and “ACP Low”. “ACP” refers to adjacent channel power. “Up” means the segment above the emissions, “Low” means the channel below the emissions.

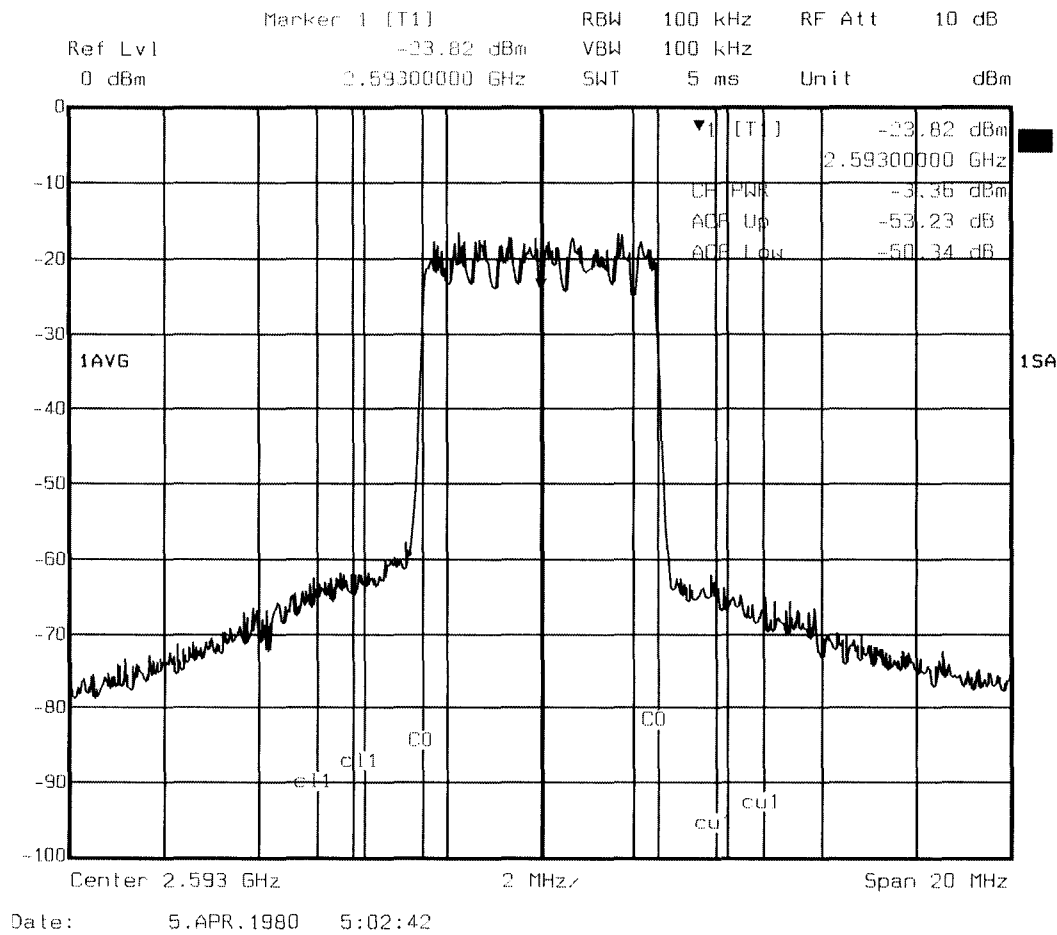
The 2 vertical cursor lines labeled “C0” define the bandwidth for the channel power measurement; in this example, 5 MHz. The 2 vertical cursor lines labeled “cl1” define the bandwidth for the lower adjacent channel power measurement; in this example, 1 MHz. The 2 vertical cursor lines labeled “cu1” define the bandwidth for the upper adjacent channel power measurement; in this example, 1 MHz.

Note that the channel power used for each trace within the four graphs is the same, - 3.5dBm. The only difference is the Resolution Bandwidth (RBW) setting.

Both “CH PWR” and the “ACP” measurements are integrated over their defined bandwidths of 5MHz and 1 MHz respectively by the resolution bandwidth selected on the instrument. In the case of Graph 1, the RBW is 100kHz. Note the high resolution of the spectral content. The spectrum analyzer can capture the actual emissions more accurately with narrower resolution bandwidth settings. The spectrum analyzer’s internal processing power allows it to accurately integrate the “CH PWR” & “ACP” over the defined bandwidth using the Resolution Bandwidth (RBW) setting.

Note the integration bandwidth is the same in all four graphs and is defined as 5MHz for the “CH PWR” measurement and 1MHz for the “ACP” measurements. The “CH PWR” from graph 1 reads -3.36dBm. The “ACP Up” measures -53.23dB.

Graph 1 –Emissions using RBW = 100kHz.

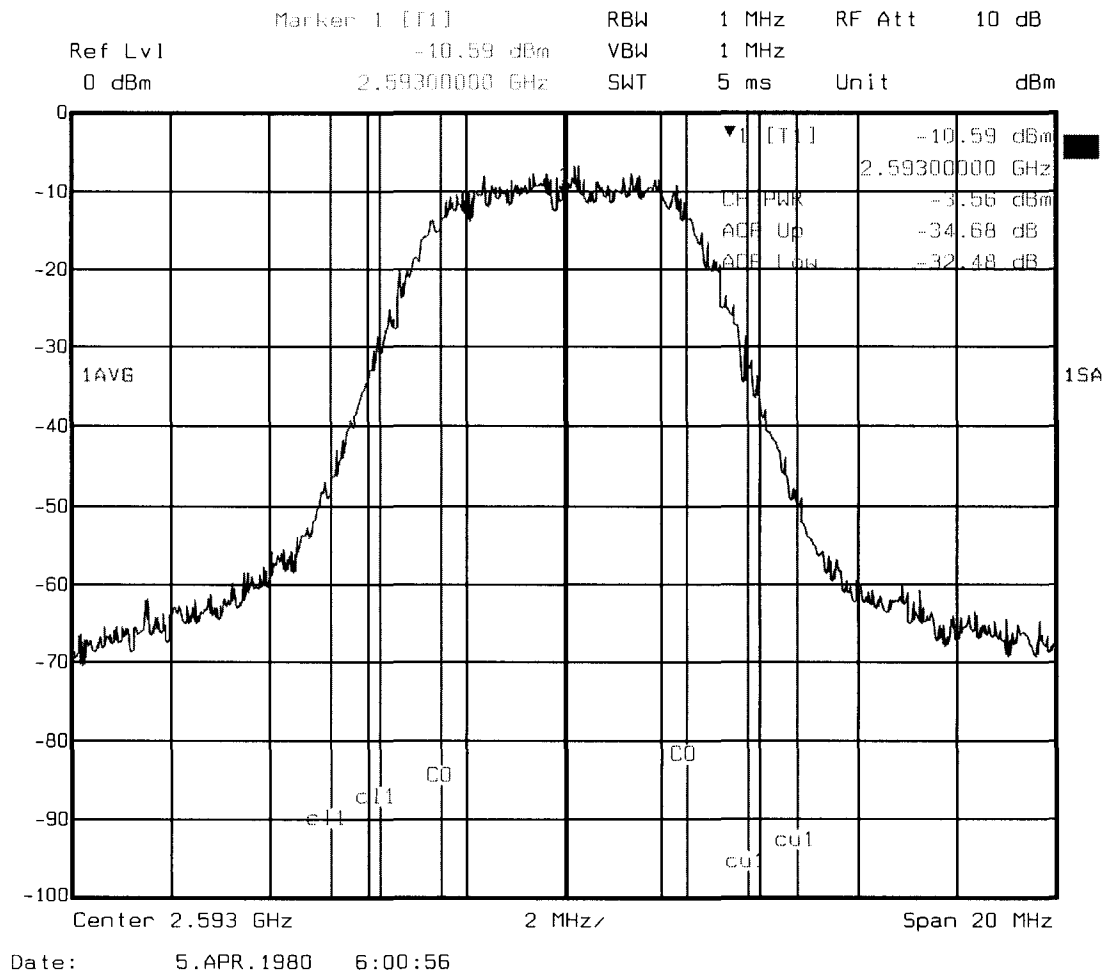


Graph 2 illustrates the same emission as measured in graph 1 using a 1MHz RBW. Note the loss in measurement resolution, as well as the apparent “bloating” of the spectrum out of the markets “C0”. For this reason, measurements close to a fundamental emission are best measured with narrow resolution bandwidths.

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The “CH PWR” from graph 2 reads -3.56dBm . The “ACP Up” measures -34.68dB . Note the apparent degradation in “ACP Up” relative to graph 1 by some 17.5dB .

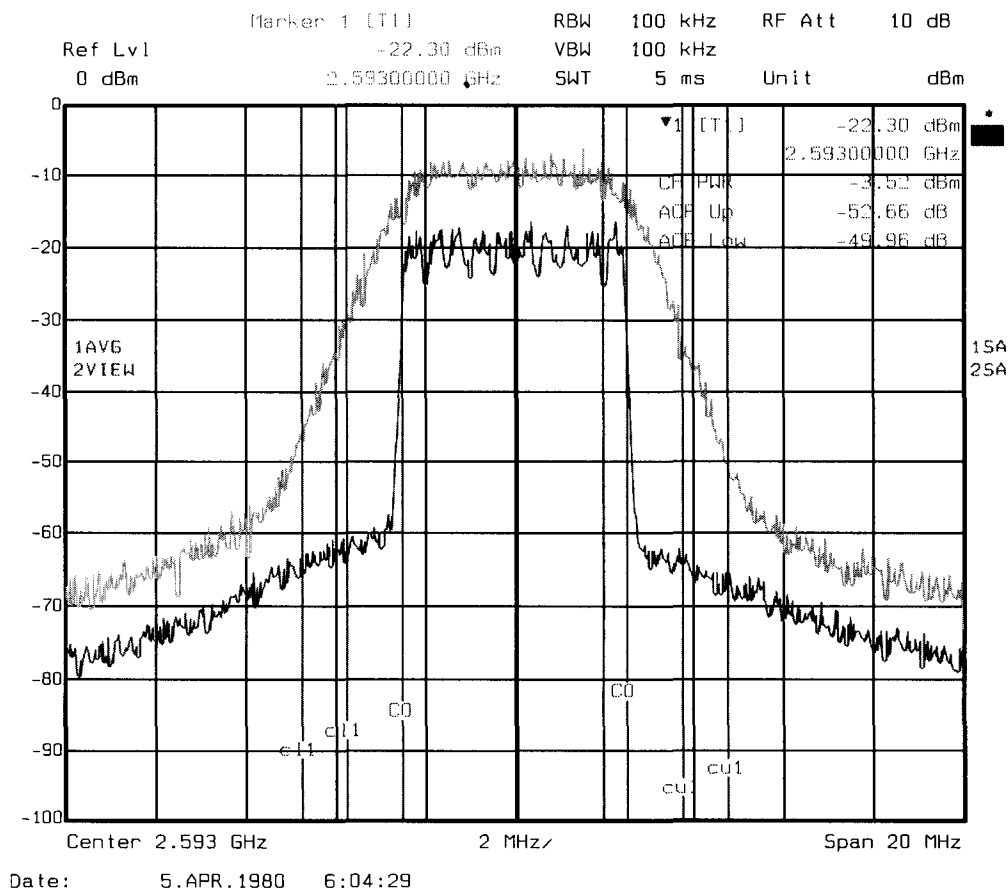
Graph 2 –Emissions using RBW = 1 MHz.



Graph 3 illustrates an overlay of two measured traces each using a different RBW. In this case, the higher resolution measurement using 100kHz RBW, displayed as the purple colored trace, is active. Active means the text based measurements for “CHP” and “ACP” are valid for the active traces RBW. The lower resolution measurement using the

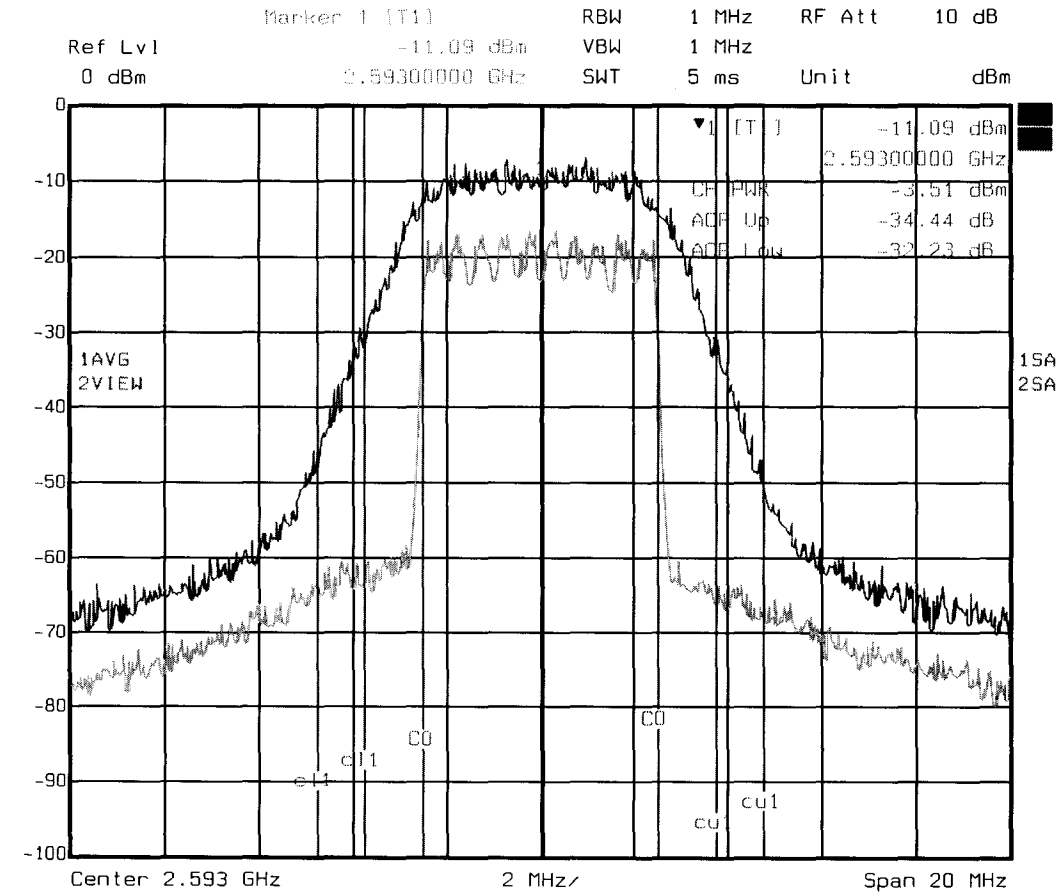
1MHz RBW is stored in memory. Note the relative difference in out of band power. The 1MHz RBW measures far more out of band power because of the wide RBW.

Graph 3 –Composite Measurement, RBW = 100 kHz is active.



Graph 4 illustrates a second overlay plot of two measured traces each using a different RBW. In this case, the lower resolution measurement using 1MHz RBW, is displayed as the purple colored trace, and is active. Active means the text based measurements for “CHP” and “ACP” are valid for the active traces RBW. The higher resolution measurement using the 100 kHz RBW is stored in memory. Note the large difference in both “ACP” readings compared to graph 3 and the large relative difference in out of channel power. Table 1 below summarizes this difference.

Graph 4 –Composite Measurement, RBW = 1 MHz is active.



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Table 1– Measurement Summary

	RBW	RBW	RBW Measurement Difference	Integration BW
	100 kHz	1 MHz		
Measurement				
CH PWR	-3.36	-3.56	-0.2	5 MHz
ACP Up	-52.66	-34.44	18.22	1 MHz
ACP Low	-49.96	-32.23	17.73	1 MHz